Amendment, claims 1-34 remain pending with claims 1-5 being under consideration and claims 6-34 being withdrawn as being drawn to a nonelected invention.

In the outstanding Office Action dated February 6, 2003, the Examiner rejected claims 1-5 under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 5,790,620 to *Okazaki et al.* This rejection is respectfully traversed because *Okazaki* does not disclose each and every one of the claimed elements. Applicants therefore request that the rejection under 35 U.S.C. § 102(e) be withdrawn.

To anticipate claims 1-5 under 35 U.S.C. §102(e), *Okazaki,* taken individually, must disclose each and every element recited in claims 1-5. *See* M.P.E.P. § 2131 (8th Ed. 2001).

Okazaki discloses a laser processing method carried out by irradiating a surface through a laser beam irradiating apparatus. *See* Abstract. *Okazaki's* laser beam apparatus comprises a pulse laser device, a beam strength adjusting device, and a mechanism for adjusting a spot diameter and a multiplexing ratio of an irradiated beam. *See id.*

Claim 1 is directed to "a laser-beam emitting head for irradiating a portion to be machined with laser beams outputted from a laser unit, said laser-beam emitting head comprising," *inter alia,* "a reflecting mirror for irradiating the portion to be machined with the converged laser beams" and "distance-adjustment means for adjusting the relative distance between the reflecting mirror and the converging lens."

In contrast, *Okazaki* does not teach at least "a reflecting mirror for irradiating the portion to be machined with the converged laser beams," as recited in claim 1. Instead,

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Okazaki teaches away from the present invention by disclosing a converging combination lens 76 for converging laser beam 72 after galvano-mirror 55 redirects laser beam 72. See Fig. 15 and col. 16, ll. 57-67, col. 18, ll. 40-55.

For at least these reasons, *Okazaki* fails to disclose each and every element recited in independent claim 1.

Claims 2-5 depend from claim 1 and include all the elements thereof. Thus, claims 2-5 are not anticipated at least based on such dependency and for at least the same reasons discussed with respect to allowable independent claim 1.

In view of the foregoing remarks, Applicants respectfully request the reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, L.L.P.

Dated: June 6, 2003

By: _____
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Reg. No. 31,744

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Application Number: 09/367,060
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Attorney Docket Number: **4724.0089-00**

APPENDIX TO AMENDMENT OF JUNE 6, 2003
VERSION WITH MARKINGS TO SHOW CHANGES MADE

AMENDMENTS TO THE SPECIFICATION

Pages 55, amendment to paragraph bridging pages 55 and 56:

As shown in Fig. 3, the laser emitting head 626 incorporates a laser-emitting-head body 632 connected to the parallel four-joint linking mechanism 655 which is the head movement mechanism 631 and formed into a flat and rectangular frame shape. The laser-emitting-head body 632 incorporates, in the central portion thereof, a head-inside light-transmission member 658 serving as a laser-beam transmission pipe which is disposed in the lengthwise direction. On the other hand, the laser-emitting-head body 632 incorporates a leading-end swing link of the parallel four-joint linking mechanism 655. The laser-emitting-head body 632 is formed into a frame structure constituted by an outer frames 660 [60] forming the swing link and forming a pair of a first frame 661 [61] supported by the outer frame 660 [60] such that rotation around a trunnion is permitted and formed into a rectangular intermediate frame and a second frame 662 [62] supported rotatively around the vertical axis of the first frame 661 [61] and serving as a rectangular inner frame.

Page 56, amendment to the paragraph bridging pages 56 and 57:

The first frame 661 [61] and the second frame 662 [62], as shown in Figs. 3 and 4, constitute an orthogonal biaxial gimbal mechanism. When the parallel four-joint linking mechanism 655 has been operated to press the laser emitting head 626 against the shroud 611, pressing portions 663 provided for the four corners of the second frame

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662 serving as the inner frame are stably brought into contact with the inner wall of the shroud 611. Thus, the laser emitting head 626 can stably and reliably be disposed in the shroud 611. Even if the preventive-maintenance/repair apparatus 620 is disposed diagonally, the gimbal mechanisms 661 and 662 absorb deviation in the directions of the horizontal axis and the vertical axis to press the laser emitting head 626.

Page 61, amendment to the first full paragraph:

As an alternative to providing the motor 668 [68] of the frame elevating unit 665 [65] for moving up and down the elevation-support frame mechanism 633 for the second frame 662 [62] of the laser-emitting-head body 632, the motor 668 [68] may be provided for the elevation-support frame mechanism 633. In this case, the frame elevating unit 665 [65] is able to move the converging lens 677 and the reflecting mirror 678 in the direction of the optical axis of the laser beam such that a predetermined distance from the converging lens 677 to the reflecting mirror 678 is maintained.

Page 62, amendment to the second full paragraph:

The laser beam L introduced into the position adjacent to the upper lattice plate 613 [13] in the reactor pressure vessel 610 by the laser-beam transmission means 625 is introduced into the main-body case 630 of the preventive-maintenance/repair apparatus 620. Specifically, the laser beam L is introduced into the stationary light-transmission pipe 645 of the main-body case 630 which constitutes the main-body locating unit 629, and then introduced into the elevating light-transmission pipe 650 from the stationary light-transmission pipe 645.

Page 65, amendment to the second full paragraph:

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An extending cylindrical 712 serving as a head-upper-portion housing is rotatively supported on the 710 of the second crank mirror 708 by the lower vertical-rotation joint 713. The extending cylindrical 712 is joined to the laser-emitting head body 632 of the laser emitting head 626 [26] through a joining bracket 714 to constitute a head upper portion 715.

Page 65, amendment to the paragraph bridging pages 65 and 66:

As shown in Fig. 7, an emitting-head upper mirror 716 is diagonally disposed at an intermediate position of the extending cylindrical 712. The upper mirror 716 is a half mirror. The laser beam L introduced into the extending cylindrical 712 by the second cranking scan mechanism 706 is reflected forward at an angle of 90° by the emitting-head upper mirror 716 so as to be passed through a seal glass 717. Then, the laser beam L is introduced into the cylindrical in-head light-transmission member 658 of the laser emitting head 626 [26] so as to be transmitted through the in-head light-transmission member 658 in the air.

Page 71, amendment to the paragraph bridging pages 71 and 72:

Then, the base elevating unit 653 is operated so that the main-body base 651 is moved up and down so that the laser emitting head 626 is moved up and down so that the position which is subjected to the laser machining working is determined. Moreover, the head movement mechanism 631 is operated to project the laser emitting head 626 over the main-body case 630. Thus, the laser emitting head 626 is pressed against the inner wall of the shroud 611 which is the incore structure 615 so as to be secured. The foregoing securing operation is stably performed by the gimbal mechanisms 661 [61]

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and 662 [62] provided for the laser emitting head 626. In a state in which the laser emitting head 626 is pressed against the inner wall of the shroud 611 and secured to the same, the lower extended portion of the laser emitting head 626 is inserted into the cylindrical small portion 621 between the shroud 611 and the core support plate 612. Specifically, the flat-frame-shape elevation-support frame mechanism 633 of the laser emitting head 626 is slid downward with respect to the laser-emitting-head body 632 by operating the frame elevating unit 665 shown in Fig. 3 so as to be inserted into the cylindrical small portion 621.

Page 75, amendment to the first full paragraph:

After a laser-beam scan for one span S has been completed, the oscillation unit 684 is operated so that the movement for one pitch P is performed. Specifically, the reflecting mirror 678 is rotated by the oscillation motor 685 to shift the laser irradiation point for one pitch P. Then, the frame elevating unit 665 [65] is operated to slide upward the elevation-support frame mechanism 633 for one span S. Then, the foregoing operation is repeated sequentially. An irradiation locus 724 of the laser beam L is formed into a zigzag shape as shown in Fig. 8 (A).

Page 77, amendment to the paragraph bridging pages 77 and 78:

To shift the laser emitting head 626, the extending force of the head movement mechanism 631 shown in Fig. 2 is reduced by operating the air cylinder of the linking operation mechanism 656. Then, the base elevating unit 653 and the turning unit 647 [47] are operated so that the laser emitting head 626 is shifted.

Page 78, amendment to the second full paragraph:

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The preventive-maintenance/repair apparatus 620 is able to machine a portion in the cylindrical small portion 621 [21] which is held between the intermediate body of the shroud which is the incore structure 615 and the core support plate 612 and which cannot easily be machined. Thus, improvement in the stress in the surface layer adjacent to the welding line by using laser beams, modification of the surface of the sensitized metallo-graphic structure and a repair operation using welding can automatically be performed by using the laser beams.

Page 89, amendment to the first full paragraph:

The light-position detecting units 863 and 864 comprise four-quadrant detectors, pointing detectors or CCD devices. The four-quadrant detector converts an equilibrium state of incident power of the reflected guide laser beam on a photoelectric surface divided into four quadrant as the position of incidence of the laser beam to detect an amount of the position deviation of the light transmission passage 811. The amount of position deviation of the guide laser beam detected by the light-position detecting units 863 and 864 is converted into an electric signal by a signal processing unit 865 so as to be supplied to the control unit 829. The control unit 829 controls the operation of the mirror adjustment unit 830 [30] or the mirror-angle adjustment unit 831 [31].

Page 93, amendment to the second full paragraph:

The light transmission passage 811 is covered with the shielded tube 818 to prevent outward leakage of light. Therefore, the target 833 for the image process cannot be observed in a case of no illumination. Therefore, the control unit 829 is caused to operate the lamp-flashing control means 843 to turn on the lamp 838

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disposed downstream of the first automatic adjustment mirror 821 so that only the target 833 for the image process is illuminated. Since the target 833 is illuminated, the CCD camera 852 is able to selectively observe the target 833. Thus, a mirror image of the first automatic adjustment mirror 821 [21] can be observed.

Page 97, amendment to the second full paragraph:

After the coarse adjustment of the automatic adjustment mirror 822 has been completed, a combination of the lamp 840, the target 835 and the automatic-adjustment mirror 823 is subjected to a similar coarse adjustment process. Thus, the coarse adjustment of the automatic adjustment mirror 823 is performed. After the coarse adjustment of the automatic-adjustment mirror 823 has been completed, a combination of the lamp 841, the target 836 [36] and the automatic-adjustment mirror 824 is subjected to a similar process. Thus, the adjustment of the automatic adjustment mirror 824 is performed.

Page 101, amendment to the first full paragraph:

The laser beam reflected from the retro-reflector 846 [46] is formed into a clockwise circularly-polarized laser beam with respect to the direction of transmission when the laser beam has been reflected by the dichroic sampling mirror 857.

Page 101, amendment to the fourth full paragraph:

The guide laser beam reflected by the automatic adjustment mirror 824 propagates toward the fixed mirror 827. Only the He-Ne laser beam of the guide laser beam is reflected by the fixed mirror 827 toward the retro-reflector 849 [49]. Residual

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laser beams penetrate the fixed mirror 827 so as to be introduced into the laser-beam emitting head 816.

Page 118, amendment to the paragraph bridging pages 118 and 119:

An image outputted from the CCD camera 852 is received by the image processing unit 855 so as to be processed. The image processing unit 855 has a central image of the target registered previously. The registered image and the image observed by the CCD camera 852 are compared with each other by a patter matching process. Thus, an amount of the deviation of the observed image from the reference registered image is detected. The detected amount of deviation in the image is supplied to the control unit 829 [29] so as to be processed. In the control unit 829, the mirror adjustment unit 830 is operated to adjust the angle of each of the automatic-adjustment mirrors 821, 822, 823 and 824 such that the amount of deviation in the image is canceled or minimized.

Page 130, amendment to the paragraph bridging pages 130 and 131:

The wavelength of the reflected guide laser beam transmitted from the retro-reflector 849 is separated by the dichroic mirror 877 which is the light separation means so as to be made incident on the light position detecting unit 881 [81]. Information of the position deviation of the guide laser beam at the position of the retro-reflector 849 is supplied to the control unit 829 through the signal processing unit 685. Since the interference filters 876 and 880 are provided for the sampling detection circuit 873, only the He-Cd laser beam is guided to the light position detecting unit 881 [81].

Page 131, amendment to the first full paragraph:

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As described above, the reflected guide laser beams from the retro-reflectors 846 and 849 are returned through the light transmission passage 811 so as to individually be made incident on the light position detecting units 879 and 881 [81]. Therefore, when the light position detecting units 879 and 881 [81] detect the first and second reflected laser beam, the two reflected laser beams can individually be detected. Thus, information about the position deviation at the positions of the retro-reflectors 846 and 849 can be separated and recognized by the control unit 829.

Page 131, amendment to the paragraph bridging pages 131 and 132:

The detection control adjustment system detects the position deviation of the reflected guide laser beams so as to adjust the angles of the automatic angle-adjustment mirrors 825 and 826. Each of the components including the light position detecting units 879 and 881 for detecting the positions of the rotated guide laser beams, the signal processing unit 865 [65], the control unit 829 and the mirror-angle adjustment unit 831 must have a quick response characteristic. Thus, position deviation of the beams caused by the vibrations of each mirror can be corrected in accordance with the speed of the feedback loop of the detection control adjustment system.

Page 132, amendment to the first full paragraph:

Moreover, in accordance with the accuracy of each of the retro-reflectors 846 and 849 and the position detection units 879 and 881 [81] and the control accuracy of the automatic angle adjustment mirrors 825 and 826, the beam transmission position can be controlled.

Page 136, amendment to the paragraph bridging pages 136 and 137:

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The light transmission apparatus 870 according to this embodiment includes the light transmission means 812 formed by combining one or more mirrors to constitute the light transmission passage 811. Moreover, a portion or all of the mirrors which constitute the light transmission passage 811 are provided with the mirror adjustment units 830 and 831 each of which is able to control the angle of inclination of the mirror from a remote position. A portion of mirrors on the light transmission passage 811 of the light transmission apparatus 870 is the half mirrors or the wavelength separation mirrors which are separation mirror means. Furthermore, the light position detecting units 879 and 881 [81] are disposed at the positions at which reflected light of the guide laser beams separated by the separation mirror means 824 and 827. In addition, the control unit 829 is provided which processes position information outputted from the light position detecting units 879 and 881 to operate the mirror-angle adjustment unit 831. Therefore, the angles of the mirrors of the automatic angle adjustment mirrors can be performed more accurately than the position deviation measuring method using the CCD camera 852. The measurement of the position can considerably quickly be completed as compared with the structure using the CCD camera. Therefore, even if the optical axis is shifted owning to vibrations of the apparatus, the automatic angle-adjustment mirrors 825 and 826 are moved in a direction in which the deviation of the optical axis is canceled. Thus, the influence of the vibrations can be eliminated.

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